

First record of Eumastacidae in Rio de Janeiro state, Brazil (Orthoptera, Caelifera)

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Abstract

Eutemnomastax Descamps, 1979 comprises four species and occurs in the states of Espírito Santo, Bahia, Minas Gerais, and Pernambuco. *Eutemnomastax burri* Descamps, 1982 is recorded for Bahia and Espírito Santo. Herein, we provide the first record of *E. burri* since its original description, and the first record of the genus and the family Eumastacidae from the state of Rio de Janeiro. We also provide photographs of primary types of *E. burri* that were destroyed in the fire at the Museu Nacional, and a distribution map for *Eutemnomastax* species.

Keywords

Atlantic Forest, distribution, diversity, grasshopper, Itatiaia National Park.

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Introduction

The family Eumastacidae generally comprises small grasshoppers, known as monkey grasshoppers and/or saltamontes payaso, with 249 species distributed mostly in the Neotropical region (Song 2018; Cigliano et al. 2020). They can be identified mainly by their resting position, in which their hind legs are in a perpendicular position to the body axis. Other diagnostic features include the antennae smaller than the anterior femur and frequently with one or two antennal organ(s), cervical membrane visible, short prothorax, and tympanum absent (Dirsh 1961; Descamps 1971; Sperber et al. 2012).

Eumastacidae is divided into eight subfamilies, seven of them occurring in the Neotropics: Eumastacinae, Masynteinae, Morseinae, Paramastacinae, Parepisactinae, Pseudomastacinae, and Temnomastacinae

(Descamps 1973a; Cigliano et al. 2020). In Brazil, there are records of 42 species in 11 genera (Rehn and Rehn 1942; Descamps 1973a, 1973b, 1979, 1982; Cigliano et al. 2020).

Four of the seven subfamilies cited above occur in Brazil, and Temnomastacinae has the largest geographical distribution (Descamps 1973a; Cigliano et al. 2020). Temnomastacinae is divided into two tribes, Eumastacopini and Temnomastacini, and is the most diverse eumastacid taxon in Brazil, with 35 species. The tribe Temnomastacini is restricted to South America and comprises 12 species in two genera, *Temnomastax* Rehn & Rehn, 1942 and *Eutemnomastax* Descamps, 1979, in Brazil (Rehn and Rehn 1942; Descamps 1973a, 1973b, 1979, 1982; Olivier et al. 2019; Cigliano et al. 2020).

The genus *Eutemnomastax* has its distribution restricted to northeastern and southeast Brazil, with published records for the states of Espírito Santo, Bahia, Minas Gerais, and Pernambuco, and currently comprises four species, *E. burri* Descamps, 1982; *E. caatingae* Descamps, 1982; *E. saurus* (Burr, 1899); and *E. striata* Descamps, 1982 (Descamps 1979, 1982) (Fig. 1). Except for *E. saurus*, all the primary types of the remaining three *Eutemnomastax* species were deposited in the Entomological Collection of the Museu Nacional, Universidade Federal do Rio de Janeiro (MNRJ), and were destroyed in the fire of 2 September 2018. Fortunately, the entire Collection of Orthoptera was previously digitalized by the team of the Digitalization Project of Entomology Collection from the Museu Nacional, funded by the Sistema Nacional de Informação sobre a Biodiversidade Brasileira and Conselho Nacional de Desenvolvimento Científico e Tecnológico (SIBBr/CNPq process number 405588/2015-1). Moreover, all primary types deposited in the Collection were photographed.

During an expedition to the Itatiaia National Park (Parque Nacional do Itatiaia), between 11–13 February 2019, we collected a single adult female of *Eutemnomastax burri*. Thus, in this paper, we provide the first

record of Eumastacidae from the state of Rio de Janeiro, Brazil. We also provide photographs of the holotype and allotype of *E. burri* that were in the collection of MNRJ (Fig. 2), and a distribution map for the genus (Fig. 1).

Methods

The expedition to the Itatiaia National Park (Parque Nacional do Itatiaia) was conducted under the license 65362-1 of ICMBIO (Instituto Chico Mendes de Conservação da Biodiversidade). The specimen was collected at the lower part of the park (809 m a.s.l.), in the borders of the road that goes to the “Casa do Pesquisador”, an accommodation for researchers (22°27'09"S, 044°36'38"W), around 5:00 pm.

The Itatiaia National Park is the oldest Brazilian national park, established in 1937, and located on the border of the states of Rio de Janeiro and Minas Gerais (ICMBio 2020). The park protects 30,000 ha of Atlantic Forest associated to the “Serra da Mantiqueira” range, with elevations varying from 600 to 2,791 m above sea level (ICMBio 2020). This altitudinal gradient is followed by four main forest types, the Sub-Montane Forest (400–900 m), Montane Forest (500–1,499 m), High

SOUTH AMERICA

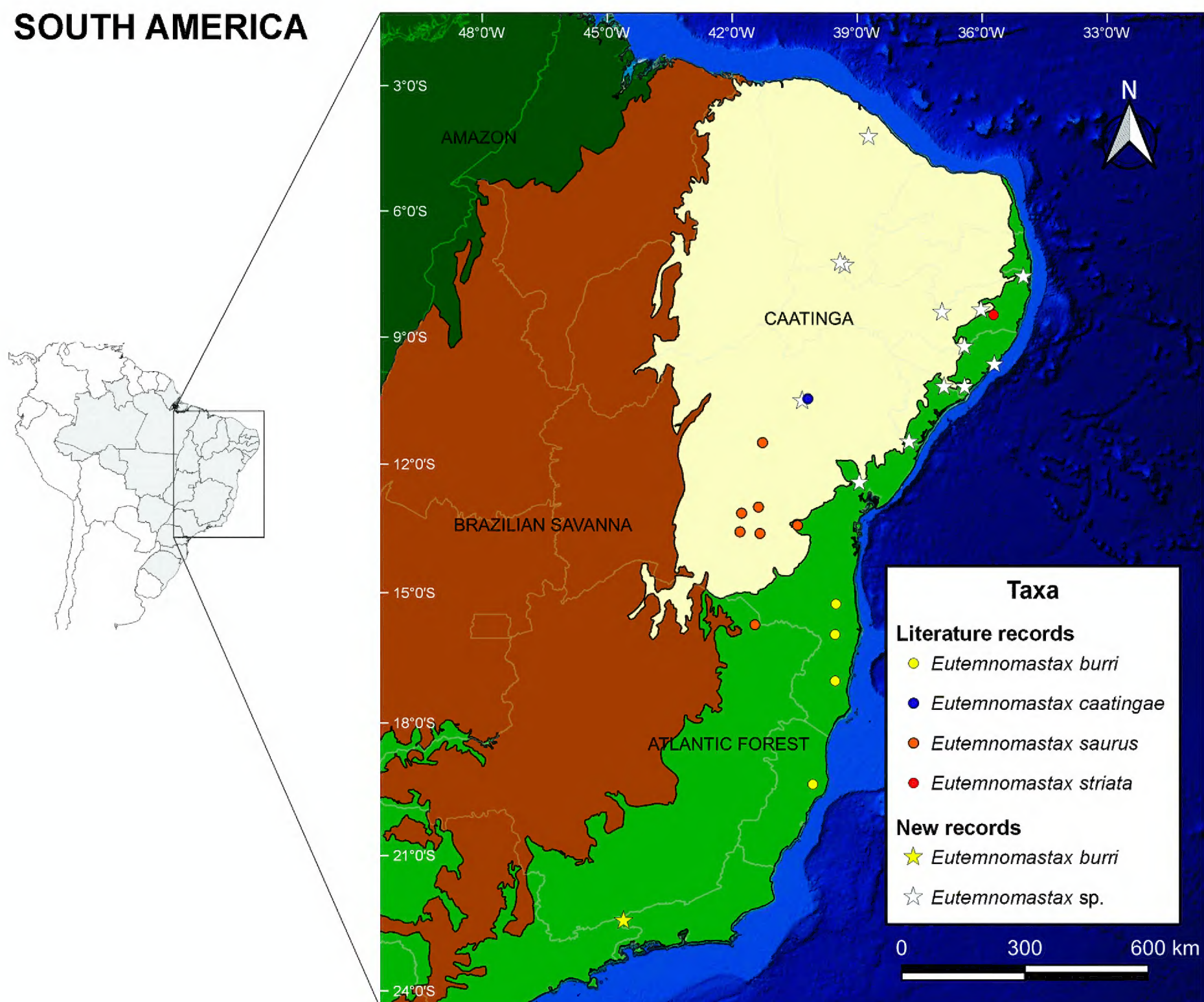


Figure 1. Distribution map of *Eutemnomastax* Descamps, 1979 species.

Montane Forest (1,500–1,999 m), and High-Altitude Grasslands (above 2,000 m) (Alves 2005; Costa et al. 2015). The park is known for the variety of landscapes and high biodiversity and endemism, due to the altitudinal gradient and the different phytophysiognomies, being recognized as one of the most important Brazilian parks (ICMBio 2020).

After the capture, the specimen was photographed using a Canon EOS Rebel T4i with a macro lens 100 mm and Canon Macro Twin Lite flash. Then, it was kept in a freezer until its transport to the laboratory. Subsequently, it was pinned and incorporated in the new Collection of Orthoptera. The pinned specimen was photographed under a Leica M205 stereomicroscope, using Leica LAS X software for capturing and stacking the images. The same equipment was used for the measurements. The final images were edited in Adobe Photoshop CS6. The distribution map was built with QGIS 3.10.7 (QGIS 2019).

The photographs of the type specimens of *E. burri* were made by SIBBr team at the MNRJ (Fig. 2). Digital images were taken with a Leica DFC450C digital camera coupled with a Leica M205 stereomicroscope, using the software Leica LAS 4.8.0 for capturing and stacking the images.

The specimen was identified using the related literature (Descamps 1982) and by comparisons with the type photographs (Fig. 2). The measurements included the lengths of body (including ovipositor) (bd), pronotum (pr) and hind femur (hf), and are given in millimeters (mm).

Results

Family Eumastacidae

Subfamily Temnomastacinae

Tribe Temnomastacini

Genus *Eutemnomastax* Descamps, 1979

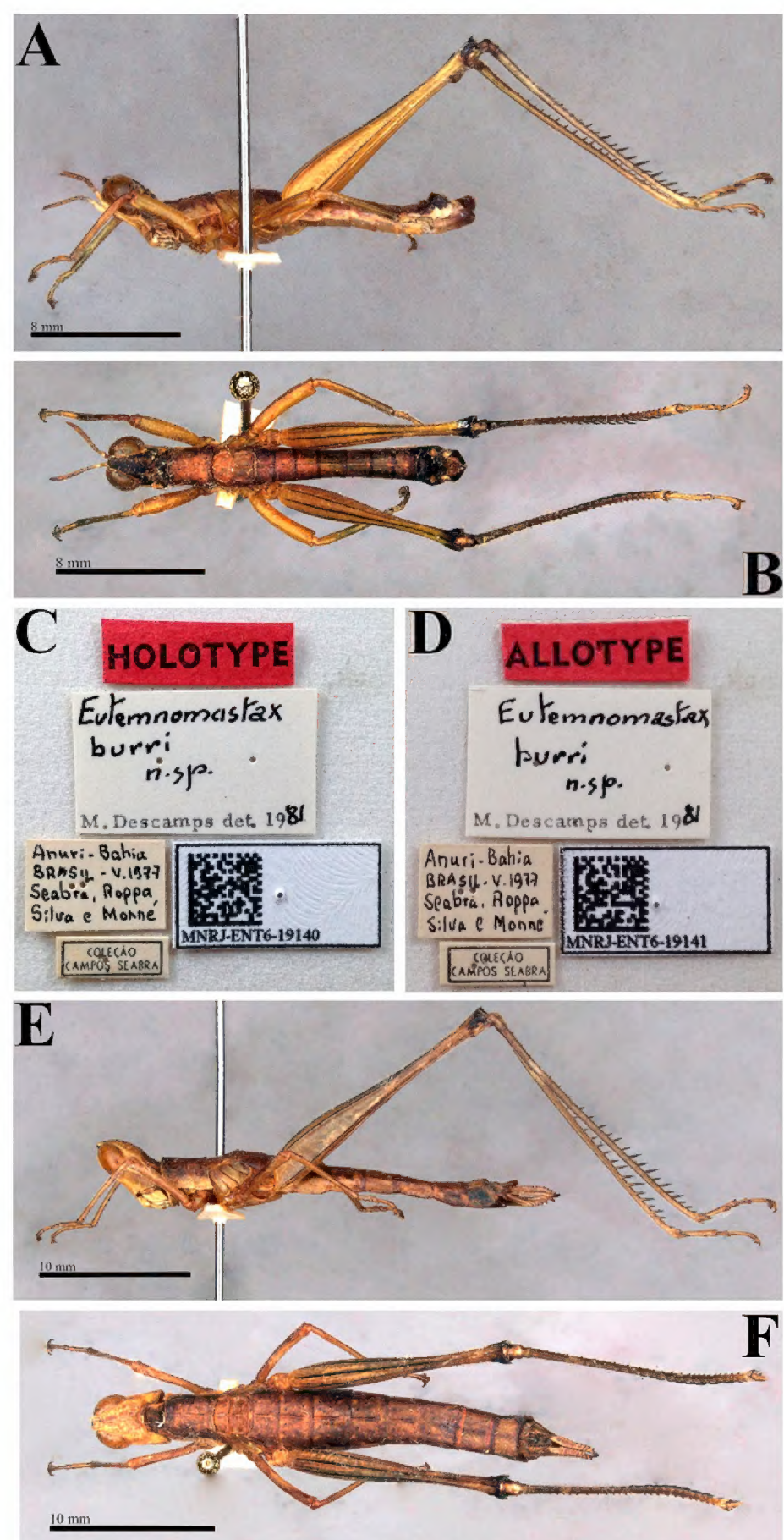
Eutemnomastax burri Descamps, 1982

Eutemnomastax burri Descamps 1982: 158; Vasconcellos and Monné 2001: 6; Monné 2018: 88; Olivier et al. 2019: 4.

Figures 2, 3

New record. BRASIL • 1 ♀, measurements (in mm.): bd = 28.08, pr = 3.01, hf = 17.57; Rio de Janeiro, Itatiaia, Parque Nacional do Itatiaia; 22°27'09"S, 044°36'38"W; 809 m a.s.l.; 11–13 Feb. 2019; Souza-Dias P.G.B., Pereira T.P.L, Siqueira A.M. leg.; MNRJ-ENT6-28776.

Identification. *Eutemnomastax burri* can be identified by the combination of the following characters: marked larger size, when compared to other species of the genus; apterous; male fastigium less protruding than in related species; general color brownish, with a yellow stripe from pronotum to the abdominal tergites (mainly visible in males and less contrasting in females); and yellow legs, especially fore and median legs (Figs 2 A, B, E, F, 3A). Moreover, the phallic complex and female



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Figure 2. Type specimens of *Eutemnomastax burri* Descamps, 1982 deposited in the Entomological Collection of MNRJ until 2 September 2018. **A.** Holotype ♂, habitus in lateral view. **B.** Same specimen, dorsal view. **C.** Holotype label. **D.** Allotype label. **E.** Allotype ♀, habitus in lateral view. **F.** Same specimen, dorsal view.

subgenital plate (Fig. 3C) are important structures for the identification of Eumastacidae species (Descamps 1973a, 1982). In *E. burri*, the female subgenital plate is rostriform, slightly salient, with spines on central part of the posterior margin (Fig. 3C, D; Descamps 1982: 159, fig. 58).

Discussion

Eutemnomastax burri Descamps, 1982 is the third described species for the Atlantic Forest of Brazil, after its congeneric *E. saurus*, recorded for the Caatinga (middle of the state of Bahia), and the Atlantic Forest in the states of Bahia (east) and Minas Gerais (northeast) (Fig. 1); and *Bahiamastax dendrophila* Descamps, 1979,

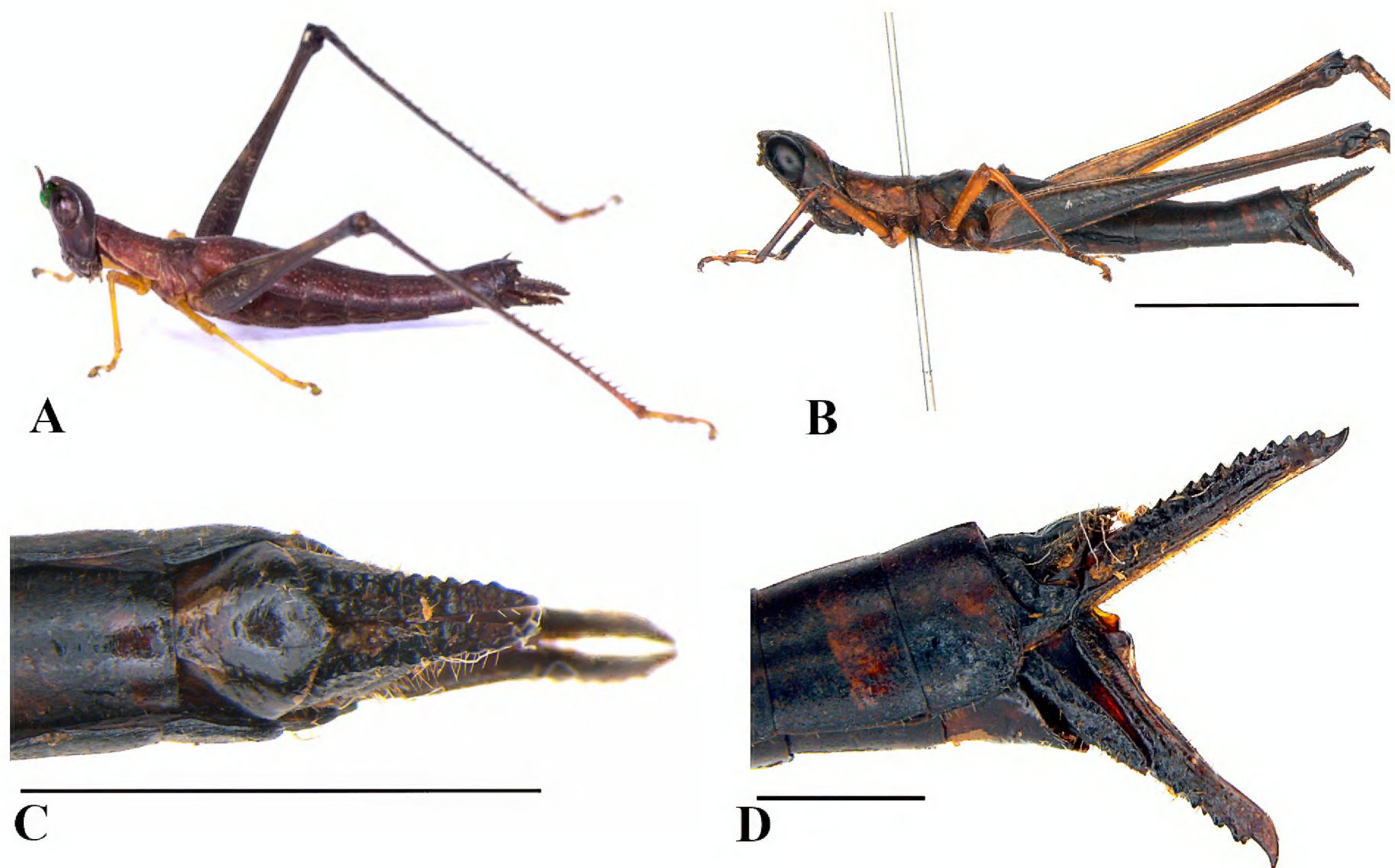


Figure 3. Female of *Eutemnomastax burri* Descamps, 1982 collected at the Itatiaia National Park. **A.** Living specimen. **B.** Same specimen, pinned, lateral view. **C.** Female subgenital plate in ventral view. **D.** Female terminalia in lateral view. Scale bars: B = 10 mm; C = 5 mm; D = 2 mm.

recorded for the states of Bahia (east) and Espírito Santo (north) (Atlantic Forest) (Descamps 1979, 1982).

Eumastacid grasshoppers remained unstudied for many years after the death of the group's main specialist, Dr Marius Descamps (Jago 1996). In Brazil, only recently studies about the eumastacid fauna have been developed (Silva et al. 2014; Olivier 2016, 2018; Olivier et al. 2019). Regarding *E. burri*, it was described 38 years ago and is found primarily in the Atlantic Forest biome. The known records are restricted to the original description made by Descamps (1982): municipalities of Arataca (Anuri district) and Itamaraju, both in the state of Bahia, and the municipality of Linhares, in the state of Espírito Santo (Fig. 1).

All *Eutemnomastax* records presented in Figure 1 (white star) were obtained from the following sources: iNaturalist platform (<https://www.inaturalist.org/>) (1), a survey published by Godé et al. (2015) (1), the Muséum National d'Histoire Naturelle database (MNHN 2020) (8), and photographic records of two colleagues (3). Although all images have been previously revised by the senior author, the identification at species level was impossible since the main morphological characters such as female subgenital plate and phallic complex could not be observed. Nevertheless, these records are important because shows that *Eutemnomastax* has a broad distribution in northeastern Brazil, occurring in both tropical/humid and xeric/dry biomes, as the Atlantic Forest and Caatinga.

Miguel Monné, professor emeritus of the Entomology

Department of the Museu Nacional, together with four other collectors, was responsible for the collections in the field of all type specimens of *E. burri* in 1977. He also told (*pers. comm.* August 2014) about the occurrence of a monkey grasshopper in Itatiaia National Park, although he was unable to collect a specimen at that moment.

Vidal-Batista and Da-Silva (1998) reported an undetermined species of Eumastacidae in Restinga de Maricá, municipality of Maricá, Rio de Janeiro; however, the specimens were not found in the Coleção Entomológica Prof. José Alfredo Pinheiro Dutra (UFRJ) for the correct identification. Thus, this is the first record of *E. burri* after its original description and the first record of an eumastacid grasshopper in the state of Rio de Janeiro. The new record is approximately 580 km south of the municipality of Linhares (state of Espírito Santo), its southernmost record, in a very preserved fragment of Atlantic Forest (Itatiaia National Park).

The specimen of *E. burri* recorded herein (Fig. 3) was collected in the first expedition of the newly created Laboratório de Orthoptera (Orthoptera Laboratory), as part of ongoing projects regarding the diversity of Orthoptera of the state of Rio de Janeiro and the reconstruction of the Entomological Collection of the Museu Nacional. The Orthoptera diversity in Rio de Janeiro is poorly known, with only one inventory published for Caelifera species (Assis-Pujol and Pujol-Luz 2014). This result shows that we are far from knowing the diversity of orthopterans in the Atlantic Forest of Rio de Janeiro.

Acknowledgements

This is the first publication on Orthoptera diversity in Rio de Janeiro from the Laboratório de Orthoptera of the Museu Nacional. We thank all the colleagues from the Departamento de Entomologia for the resilience and brave efforts to continue doing science and rebuilding the Entomological Collection. We also express our gratitude to colleagues from the Departamento de Vertebrados from receiving us in their building, specially José Pomal Jr., Paulo Passos, Pedro Pinna, Manoela Woitovicz Cardoso, Marcos Raposo, and Tomas Capdeville.

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Authors' Contributions

AMS, JMV and PGBSD collected the specimen, identified at family level, prepared, and added to the Entomological Collection of MNRJ. RSO identified the species, raised distributional data, and build the map. PGBSD got the funding, organized the expedition, and made the figures and photographs. All authors participated in the writing process of the manuscript.

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